



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|-------------------------------|-------------|----------------------|---------------------|------------------|
| 10/826,264 | 04/19/2004 | Hyun-Sang Chung | 3430-0202P | 9415 |
| 2292 | 7590 | 06/15/2006 | EXAMINER | |
| BIRCH STEWART KOLASCH & BIRCH | | | DUONG, THOI V | |
| PO BOX 747 | | | | |
| FALLS CHURCH, VA 22040-0747 | | | ART UNIT | PAPER NUMBER |
| | | | 2871 | |

DATE MAILED: 06/15/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

| | | | |
|------------------------------|---------------------------|---------------------|--|
| Office Action Summary | Application No. | Applicant(s) | |
| | 10/826,264 | CHUNG ET AL. | |
| | Examiner Thoi V. Duong | Art Unit 2871 | |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 03 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) Responsive to communication(s) filed on 28 March 2006.
- 2a) This action is **FINAL**. 2b) This action is non-final.
- 3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) Claim(s) 1-34 is/are pending in the application.
 - 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) Claim(s) _____ is/are allowed.
- 6) Claim(s) 1-34 is/are rejected.
- 7) Claim(s) _____ is/are objected to.
- 8) Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) The specification is objected to by the Examiner.
- 10) The drawing(s) filed on _____ is/are: a) accepted or b) objected to by the Examiner.
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 - a) All b) Some * c) None of:
 1. Certified copies of the priority documents have been received.
 2. Certified copies of the priority documents have been received in Application No. _____.
 3. Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ . |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____ . | 6) <input type="checkbox"/> Other: _____ . |

DETAILED ACTION

1. This office action is in response to the Amendment filed March 28, 2006.

Accordingly, claims 5, 8, 11, 18 and 23 were amended, and new claims 25-34 were added. Currently, claims 1-34 are pending in this application.

Response to Arguments

2. Applicant's arguments with respect to claims 1 and 15 have been considered but are moot in view of the new ground(s) of rejection.

Claim Objections

3. Claim 31 is objected to because of the following informalities: in line 4, "the plurality of supporting spacers" should be --the plurality of supporting patterns--. Appropriate correction is required.

Claim Rejections - 35 USC § 102

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claim 1 is rejected under 35 U.S.C. 102(b) as being anticipated by Tashiro et al. (Tashiro, US 2002/0196393 A1).

Tashiro discloses a liquid crystal display (LCD) device, comprising:

a first substrate 16 having a first region comprising liquid crystal display LC (as a display area 10 shown in Fig. 1a) and a second region, wherein the second region surrounds the first region as shown in Fig. 91;

a plurality of patterned spacers 15 (pillar-shape spacers) over the first substrate 16 in the first region as shown in Figs. 13a and 13b (paragraph 215);

a plurality of supporting patterns 96 (protruding portions) spaced apart from each other over the first substrate 16 in the second region as shown in Figs. 91 and 93 (paragraph 454);

a plurality of seal patterns 6, 7 in the second region including the plurality of supporting patterns as shown in Figs. 91 and 92 (paragraph 455);

a second substrate 4 spaced apart from and attached to the first substrate 16 by the seal patterns 6, 7 as shown in Fig. 92; and

a liquid crystal layer 22 between the first and second substrates 16 and 4 as shown in Figs. 91 and 92.

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. Claims 1, 2, 5-7, 9, 11-17, 21, 22, 24 and 28-30 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hiroshima et al. (Hiroshima, US 6,705,584 B2) in view of Sakai et al. (Sakai, US 6,222,603 B1).

Re claim 1, as shown in Figs. 1-4, Hiroshima discloses a liquid crystal display (LCD) device, comprising:

a first substrate SUB2 having a first region comprising liquid crystal LC (display area) and a second region (peripheral portion), wherein the second region surrounds the first region (col. 5, lines 40-48);

a plurality of patterned spacers SP1 (columnar spacers) over the first substrate SUB2 in the first region (col. 9, lines 50-61 and col. 10, lines 7-10);

a plurality of supporting patterns SP2, SP3 (columnar spacers) over the first substrate SUB2 in the second region (col. 9, lines 50-54 and col. 10, lines 7-10);

a seal pattern SL in the second region including the plurality of supporting patterns SP2, SP3 (col. 9, lines 50-54);

a second substrate SUB1 spaced apart from and attached to the first substrate SUB2 by the seal pattern SL (col. 10, lines 31-34 and col. 12, lines 59-67); and

a liquid crystal layer LC between the first and second substrates SUB2 and SUB1 (col. 11, lines 36-39).

Re claim 15, as shown in Figs. 1-4, Hiroshima discloses a method of manufacturing a liquid crystal display, comprising:

forming a plurality of patterned spacers SP1 (columnar spacers) in a first region comprising liquid crystal LC (display area) and a plurality of supporting patterns SP2, SP3 (columnar spacers) in a second region over a first substrate SUB2, wherein the second region surrounds the first region (col. 5, lines 40-48; col. 9, lines 50-61 and col. 10, lines 7-10);

forming a seal pattern SL in the second region including the plurality of supporting patterns SP2, SP3 (col. 9, lines 50-54);

disposing the first substrate SUB2 over a second substrate SUB1 and attaching the first and second substrates by using the seal pattern SL (col. 10, lines 31-34 and col. 12, lines 59-67); and

injecting a liquid crystal material LC between the first and second substrates SUB2 and SUB1 (col. 11, lines 36-39).

However, Hiroshima does not disclose a plurality of seal patterns in the second region.

As shown in Fig. 4, Sakai discloses an LCD device comprising a plurality of seal patterns 6 and 11 for forming a more uniform gap during the process of attaching the substrates (col. 5, lines 28-35 and col. 7, lines 32-45).

Thus, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the LCD device of Hiroshima with the teaching of Sakai by forming a plurality of seal patterns in the second region in order to obtain a more uniform gap during the process of attaching the substrates (col. 5, lines 28-32).

Re claim 2, as shown in Fig. 1, the LCD device of Hiroshima further comprises a color filter layer FIL between the first substrate SUB2 and the plurality of patterned spacers SP1, wherein the color filter layer FIL is composed of red, green and blue sub-color filters (col. 9, lines 27-30).

Re claim 5, as shown in Fig. 1, the LCD of Hiroshima further comprises a black matrix BM between the sub-color filters (col. 9, lines 27-30),

wherein, re claim 6, the plurality of patterned spacers SP1 correspond to the black matrix BM (col. 9, lines 54-56).

Re claim 7, as shown in Fig. 1, the LCD of Hiroshima further comprises a common electrode ITO2 between the patterned spacers SP1 and the color filter layer FIL (col. 9, lines 41-43).

Re claims 9, Hiroshima discloses that the second substrate SUB1 is a TFT (thin film transistor) substrate. Accordingly, the second substrate SUB1 comprises an array element layer over an inner surface of the second substrate SUB1, wherein the array element layer includes a pixel electrode (col. 4, lines 37-40; col. 9, lines 20-25 and col. 10, lines 24-30).

Re claim 11, Hiroshima discloses that the supporting patterns SP2, SP3 are formed of a same material (resin-containing photosensitive material) through a same process as the plurality of patterned spacers SP1 (after forming common electrode ITO2) (col. 9, lines 44-61 and col. 10, lines 61-66).

Re claims 12 and 16, Hiroshima discloses that a thickness of the liquid crystal layer is defined as a cell gap (col. 9, lines 16-20), which is determined by thicknesses of the patterned spacers SP1 and the supporting patterns SP2, SP3 (col. 10, lines 31-36).

Re claim 13, Hiroshima discloses that the supporting patterns SP2, SP3 formed along the seal pattern SL to compensate for the deformation of the seal pattern (see Abstract); accordingly, the supporting patterns SP2, SP3 act as a supporter of the seal pattern SL.

Re claim 17, the method of Hiroshima further comprises a step of forming a color filter layer FIL before forming the plurality of patterned spacers SP1 and supporting

patterns SP2, SP3, wherein the color filter layer FIL is composed of red, green and blue sub-color filters (col. 9, lines 26-61).

Re claim 21, as shown in Fig. 1, the method of Hiroshima further comprises forming a black matrix BM before forming the color filter FIL, wherein the black matrix BM corresponds to an interface between the sub-color filters FIL (col. 9, lines 27-30).

Re claim 22, Sakai discloses that the seal pattern 6 shown in Fig. 4 is formed by one of a screen-printing method and a dispensing method (col. 5, lines 26-28).

Re claims 14 and 24, Sakai discloses that the seal pattern 6 is formed of epoxy resin of heat curing type or ultraviolet curing type (col. 4, lines 26-28); accordingly, the seal pattern contains no glass fibers.

Re claims 28 and 29, as shown in Fig. 1, Hiroshima further discloses a plurality of black matrix portions BM, each black matrix portion BM being formed in between adjacent sub-color filters FIL, wherein each black matrix portion BM corresponds to a particular patterned spacer of the plurality of patterned spacers SP1 (col. 9, lines 54-56).

Re claim 30, as shown in Fig. 1, the method of Hiroshima further comprises forming a common electrode ITO₂ over the color filter layer FIL prior to forming the plurality of patterned spacers SP1 and the plurality of supporting spacers SP2, SP3 (col. 9, lines 44-50).

7. Claims 3, 4, 8, 10, 18-20, 23, 25 and 31-33 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hiroshima et al. (Hiroshima, US 6,705,584 B2) in view of

Sakai et al. (Sakai, US 6,222,603 B1) as applied to claims 1, 2, 5-7, 9, 11-17, 21, 22, 24 and 28-30 above, and further in view of Ishikawa et al. (Ishikawa, USPN 6,414,733 B1).

Re claims 3 and 18, the LCD device as well as the method of manufacturing the same of Hiroshima as modified in view of Sakai above includes all that is recited in claims 3 and 18 except for a plurality of compensating patterns formed between the first substrate and the plurality of supporting patterns.

As shown in Figs. 5 and 6A-6E, Ishikawa discloses a method of manufacturing an LCD device comprising a step of forming a compensating pattern 13R' (dummy colored layer) corresponding to a supporting pattern 14 (shielding member) between a first substrate 11 and the supporting pattern 14 before forming a plurality of patterned spacers 18 (columnar convex portions) and the supporting pattern 14 so as to efficiently fill the liquid crystal material and allow the production of the display in a simpler process (col. 4, lines 38-59; col. 15, line 66 through col. 16, line 41; and col. 17, lines 4-64).

Thus, it would have been obvious to one having ordinary skill in the art at the time the invention was made to further modify the method of manufacturing an LCD device of Hiroshima with the teaching of Ishikawa by forming a plurality of compensating patterns corresponding to a plurality of supporting patterns before forming a plurality of patterned spacers and supporting patterns in order to avoid disorders such as a reduction in the filling rate of the liquid crystal and allow the production of the display in a simpler process (col. 4, lines 46-59).

Accordingly, with the modification, the plurality of compensating patterns corresponding to the plurality of supporting patterns are obviously spaced apart from

each other since the plurality of supporting patterns SP2, SP3 shown in Figs. 1-4 of Hiroshima are spaced apart from each other.

Re claim 4, as shown in Fig. 6A, Ishikawa discloses that the compensating pattern 13R' is formed of a same material as the color filter layer 13R (col. 17, lines 4-9).

Similarly, re claim 19, as shown in Fig. 6A, Ishikawa discloses that forming the compensating pattern 13R' is simultaneously performed with forming the color filter layer 13R (col. 17, lines 4-9).

Re claim 20, as shown in Figs. 6E of Ishikawa, the compensating pattern 13R' corresponds to the supporting pattern 14.

Re claim 33, as shown in Fig. 7D of Ishikawa, the compensating pattern 13R' is in physical contact with the corresponding supporting pattern 14.

Re claim 8, as shown in Figs. 5 and 6B-6E, the LCD device of Ishikawa further comprises further comprising a conductive material pattern (on top of the compensating pattern 13R') between the supporting pattern 14 and the first substrate 11, wherein the conductive material pattern is formed of a same material as the common electrode 16 since the conductive material pattern is of the same layer with the common electrode 16.

Similarly, re claim 31, as shown in Figs. 5 and 6B-6E, the method of Ishikawa further comprises forming a conductive material pattern 16 in the second region B over the compensating patterns 13R' prior to forming the plurality of patterned spacers 18 and the supporting pattern 14, wherein the compensating pattern 13R' has a conductive

material pattern 16 formed over it. Accordingly, with the modification, the plurality of conductive material patterns corresponding to the plurality of compensating patterns are obviously formed over the plurality of compensating patterns corresponding to the plurality of supporting patterns SP2, SP3 shown in Figs. 1-4 of Hiroshima.

Re claim 32, as shown in Figs. 5 and 6A-6E of Ishikawa, it is obvious that the step to form the conductive material pattern 16 is also performed prior to forming the seal pattern 4 in the second region B such that the conductive material pattern 16 is formed over the first substrate 11 in the second region B corresponding to the location of the seal pattern 4. Accordingly, with the modification, the plurality of conductive material patterns are formed corresponding to the plurality of seal patterns 6, 11 of Sakai since these seal patterns are also formed in the second region.

Re claim 10, as shown in Fig. 3, the LCD device of Ishikawa further comprises an array element layer (thin film transistor and wirings) over the second substrate 21, wherein the array element layer includes a pixel electrode 22b and a common electrode 22a (col. 10, lines 52-59).

Re claim 23, as shown in Fig. 1 of Hiroshima, the sealant pattern SL is formed between the adjacent supporting patterns SP2 and SP3. Accordingly, with the modification, it is obvious that each seal pattern is disposed between adjacent compensating patterns and between adjacent supporting patterns.

Re claim 25, Figs. 5 and 6E of Ishikawa show that each compensating pattern 13R' corresponds to a particular supporting pattern 14.

8. Claims 1, 15, 16 and 27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yanagawa et al. (Yanagawa, US 2001/0033356 A1).

Re claim 1, as shown in Figs. 1A, 1B, 2 and 3, Yanagawa discloses a liquid crystal display (LCD) device, comprising:

a first substrate SUB2 having a first region comprising liquid crystal LC (display area AR) and a second region (outside the display area), wherein the second region surrounds the first region (paragraph 40);

a plurality of patterned spacers PRO (projection bodies) over the first substrate SUB2 in the first region (paragraphs 45-48);

a plurality of supporting patterns PRO over the first substrate SUB2 in the second region (paragraphs 46-48);

a seal material SL in the second region including the plurality of supporting patterns PRO (paragraph 48);

a second substrate SUB1 spaced apart from and attached to the first substrate SUB2 by the seal material SL (paragraphs 38 and 39); and

a liquid crystal layer LC between the first and second substrates SUB2 and SUB1 (paragraph 38).

Re claim 15, as shown in Figs. 1A and 1B, Hiroshima discloses a method of manufacturing a liquid crystal display, comprising:

forming a plurality of patterned spacers PRO (projection bodies) in a first region comprising liquid crystal LC (display area AR) and a plurality of supporting patterns

PRO in a second region (outside the display area) over a first substrate SUB2, wherein the second region surrounds the first region (paragraphs 40 and 46-48);

forming a seal material SL in the second region including the plurality of supporting patterns PRO (paragraph 48);
disposing the first substrate SUB2 over a second substrate SUB1 and attaching the first and second substrates by using the seal material SL (paragraph 39); and
injecting a liquid crystal material LC between the first and second substrates SUB2 and SUB1 (paragraph 38).

Yanagawa discloses an LCD device that is basically the same as that recited in claims 1 and 15 except for plurality of seal patterns formed in the second region.

However, as shown in Figs. 1B, 2 and 3, Yanagawa discloses that the supporting patterns PRO formed inside the seal material SL are in parallel with one another along the seal material SL (paragraph 49). Accordingly, it is obvious that the seal material SL comprises a plurality of seal patterns divided by the plurality of supporting patterns PRO in order to accurately retain the resulting gap between the substrates SUB1 and SUB2 by the supporting patterns PRO with high precision in the second region while at the same time permitting rigid adhesion of the substrates by the seal material SL (paragraph 50).

Re claim 27, with the above structural arrangement, it is also obvious that each supporting pattern PRO in the seal material SL comprising the plurality of seal patterns is in physical contact with at least one adjacent seal pattern as shown in Figs. 1B, 2 and 3.

Re claim 16, Yanagawa discloses that a cell gap defined by a thickness of the liquid crystal layer LC is determined by thicknesses of the patterned spacers and the supporting patterns PRO (paragraphs 45-47).

9. Claims 26, 27 and 34 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hiroshima et al. (Hiroshima, US 6,705,584 B2) in view of Sakai et al. (Sakai, US 6,222,603 B1) as applied to claims 1, 2, 5-7, 9, 11-17, 21, 22, 24 and 28-30, and Ishikawa et al. (Ishikawa, USPN 6,414,733 B1) as applied to claims 3, 4, 8, 10, 18-20, 23, 25 and 31-33, and further in view of Yanagawa et al. (Yanagawa, US 2001/0033356 A1).

The LCD device of Hiroshima as well as the method for manufacturing the same as modified in view of Sakai and Ishikawa above includes all that is recited in claims 26, 27 and 34 except for each supporting pattern (and the corresponding compensating pattern) being in contact with at least one adjacent seal pattern.

As shown in Figs. 1A, 1B, 2 and 3, Yanagawa discloses a liquid crystal display (LCD) device, comprising:

a plurality of patterned spacers PRO (projection bodies) over the first substrate SUB2 in a first region (display area AR) (paragraphs 40 and 46-48);

a plurality of supporting patterns PRO over the first substrate SUB2 in a second region (outside the display area), wherein the second region surrounds the first region (paragraphs 46-48); and

a seal material SL in the second region including the plurality of supporting patterns PRO (paragraphs 48-49).

Re claim 27, as shown in Figs. 1B, 2 and 3, Yanagawa discloses that the supporting patterns PRO formed inside the seal material SL are in parallel with one another along the seal material SL (paragraph 49). Accordingly, it is obvious that the seal material SL comprises a plurality of seal patterns divided by the plurality of supporting patterns PRO in order to accurately retain the resulting gap between the substrates SUB1 and SUB2 by the supporting patterns PRO with high precision in the second region while at the same time permitting rigid adhesion of the substrates by the seal material SL (paragraph 50).

According to the above structure, each supporting pattern PRO in the seal material SL, which comprises the plurality of seal patterns (3 ea.), is in physical contact with at least one adjacent seal pattern as shown in Figs. 1B, 2 and 3.

Thus, it would have been obvious to one having ordinary skill in the art at the time the invention was made to further modify the LCD device of Hiroshima with the teaching of Yanagawa by forming each supporting pattern being in contact with at least one adjacent seal pattern in order to perform gap definition between respective substrates with increased accuracy and reliability (see Abstract and paragraph 50).

Re claims 26 and 34, it is also obvious that, with the modification, the compensating pattern corresponding with each supporting pattern is also in contact with at least one adjacent seal pattern.

Conclusion

10. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Thoi V. Duong whose telephone number is (571) 272-

Art Unit: 2871

2292. The examiner can normally be reached on Monday-Friday from 8:30 am to 4:30 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David Nelms, can be reached at (571) 272-1787.

Thoi V. Duong



06/08/2006